

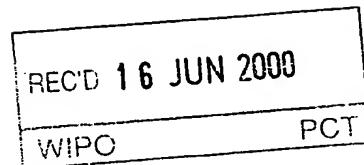


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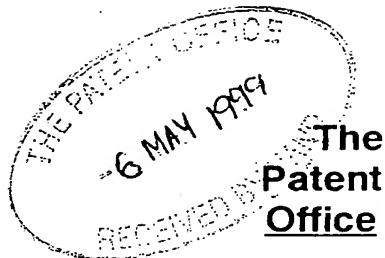
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Request for grant of a patent

The Patent Office
Cardiff Road
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1. Your reference **5282101/JAC**

2. Patent Application Number **6 MAY 1999** **9910505.8**

3. Full name, address and postcode of the or of each applicant (*underline all surnames*)

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6531904/CCI

Patents ADP number (*if known*)

If the applicant is a corporate body, give the
country/state of its incorporation

Country: UNITED KINGDOM

4. Title of the invention

A METHOD AND APPARATUS FOR MANUFACTURING CONSUMABLE TABLETS

5. Name of agent **Beresford & Co**

"Address for Service" in the United Kingdom
to which all correspondence should be sent
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London WC1R 5DJ**

Patents ADP number

1826001

6. Priority details

Country

Priority application number

Date of filing

Patents Form 1/77

7. If this application is divided or otherwise derived from an earlier UK application give details

Number of earlier of application Date of filing

8. Is a statement of inventorship and or right to grant of a patent required in support of this request?

YES

9. Enter the number of sheets for any of the following items you are filing with this form.

Continuation sheets of this form	0
Description	16
Claim(s)	9
Abstract	0
Drawing(s)	9

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10. If you are also filing any of the following, state how many against each item.

Priority documents	N/A
Translations of priority documents	N/A
Statement of inventorship and right to grant of a patent (<i>Patents form 7/77</i>)	
Request for preliminary examination and search (<i>Patents Form 9/77</i>)	
Request for Substantive Examination (<i>Patents Form 10/77</i>)	
Any other documents (please specify)	

11. I/We request the grant of a patent on the basis of this application

Signature



BERESFORD & Co

Date 6 May 1999

12. Name and daytime telephone number of
person to contact in the United Kingdom JANE CLARK
Tel:0171-831-2290

A METHOD AND APPARATUS FOR MANUFACTURING
CONSUMABLE TABLETS

This invention relates to a method and apparatus for
5 manufacturing consumable tablets especially, but not
exclusively, consumable tablets carrying at least one
pharmacologically or biologically active ingredient for
therapeutic or prophylactic treatment of a mammal such
as a human being.

10 Conventional medicines to be ingested in a solid
form are manufactured as a compressed solid tablet or a
capsule containing granules which when swallowed is
attacked by the digestive juices in the stomach so as to
release the active ingredient carried by the tablet or
15 capsule into the blood stream via the stomach lining.
Some patients have, however, difficulty in swallowing
tablets or capsules. To address this problem, tablets or
pills that dissolve on the tongue or in the mouth have
been manufactured. Such quick dissolving tablets are
20 conventionally formed by dissolving food or
pharmacological grade gelatin to form a gelatin solution.
The gelatin solution is then frozen solid converting the
water content into ice. The unbound ice is then removed
by applying a uniform heat across the frozen sample. This
25 causes the ice crystals to sublime turning them directly
into water vapour which is collected by a water vapour
condenser. The frozen sample and the water vapour

condenser are placed under vacuum to encourage the orderly migration of water vapour to the condenser and so as to assure that the pressure of the water vapour remains below its triple point as is required for
5 sublimation to occur. Secondary drying is then required to remove the tightly bound (sorbed) water that is strongly attached to the protein molecules. This tightly bound water is difficult to remove because it has a lower vapour pressure than free liquid at the same temperature.
10 Accordingly this secondary drying is a slow process.

The initial rigid ice matrix of the frozen sample and the exceptionally gentle drying ensure that the dried resulting product maintains its structural integrity.

15 The above described process results in tablets or pills that regularly dissolve or disintegrate in the mouth or on the tongue. However, the process described above is a relatively complex process and has to be carried out as a batch-by-batch process.

It is the aim of the present invention to provide
20 apparatus for and a method of manufacturing consumable tablets that may dissolve or disintegrate rapidly in the mouth or on the tongue, suitable for continuous mass production.

In one aspect, the present invention provides a
25 method of manufacturing consumable tablets which comprises using electrohydrodynamic comminution to form a plurality of individual tablets or pills each of which

consists of a fibre web or mat which will dissolve or disintegrate on the tongue or in the mouth of a consumer such as a patient.

5 Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 shows a part sectional very schematic side view of apparatus embodying the invention;

10 Figure 2 shows a part sectional view taken along the line II-II in Figure 1;

Figure 3 shows a very schematic part sectional view of a modified form of the apparatus shown in Figure 1;

Figure 4 shows very schematically a further modification of the apparatus shown in Figure 1;

15 Figure 5 shows a part sectional very diagrammatic view of a further modification of the apparatus;

Figure 6 shows diagrammatically a modified form of comminution arrangement for use in the apparatus shown in any of Figures 1 to 5;

20 Figures 7 to 9 show electronmicrographs with Figures 7 and 8 illustrating the structure of a tablet produced by the conventional freeze gelling technique and Figure 9 illustrating the structure of a tablet produced using a method embodying the present invention.

25 Referring now to the drawings, the apparatus 1 shown in Figure 1 consists of a container 2 made of thermally insulative material such as a glass, or a plastics

material such as Perspex (trade mark).

A comminution arrangement 3 is mounted within the chamber 2. The comminution arrangement 3 comprises a hollow tube 4 having an outlet nozzle 4'. The tube 4 is 5 electrically conductive at least adjacent its nozzle 4'. The electrically conductive nozzle 4' is coupled to the earth terminal E of a high voltage source or supply 5 mounted outside the chamber 2. The high voltage terminal 5a of the high voltage supply 5 is coupled to a corona 10 discharge electrode 50 for charging a support surface 6 disposed opposite the outlet nozzle 4a so as to enable an electric field to be established between the nozzle 4a and the support surface 6. Other ways of charging the support surface 6 such as a brush contact may be used, 15 but the use of a corona discharge electrode 50 has the advantage of avoiding arcing and subsequent erosion.

The support surface 6 is in the form of a conveyor belt supported along its length (see Figure 2) by rollers 60 rotably mounted to supports (not shown) such 20 that, as shown most clearly by Figure 2, the conveyor belt 6 extends at an angle to the horizontal. One of the rollers 60 is fixedly mounted to the spindle 7a of a drive motor 7 mounted outside the chamber 2.

As shown in Figure 2, the conveyor belt extends 25 through an aperture 2a provided in the chamber 2. To maintain the environment within the chamber 2a and to assist in formation of the tablets as will be described

below, the aperture 2a has flexible lips 20 formed of a rubber or plastics material which press onto the surface of the conveyor belt 6. A heater 8 may be mounted within the chamber so as to direct warm air into the region 40 5 where liquid issuing from the nozzle 4a is subject to the electric field established between the nozzle 4a and the support surface 6.

A perforate wall 2b of the chamber 2 separates the main chamber from a subsidiary chamber 2c which houses 10 an exhaust pump 14. The exhaust pump 14 has an outlet 14a for exhausting air to the outside of the chamber 2.

Liquid is supplied to the tube 4 from a liquid supply reservoir 9 mounted outside the chamber 2 by means of a pump 10.

15 As shown in Figure 2 a horizontal further conveyor belt 6' is supported on rollers 60 adjacent the conveyor belt 6 so that in known manner material can pass directly from the conveyor belt 6 to the conveyor belt 6'. A cutting device 11 is mounted above the further conveyor 20 belt 6' outside of the chamber 2 so that a matrix of cutting blades 11a of the cutting device are moveable towards and away from the conveyor belt. A hopper 12 is mounted beneath the end of the conveyor belt to receive the resulting tablets or pills.

25 As shown in Figure 2, a spraying device 13 may be provided at the end of the further conveyor belt to spray the resulting tablets with a final coating as will be

explained below.

In use of the apparatus shown in Figure 1, the high voltage 5 is first switched on to establish an electric field between the nozzle 4' and the support surface 6.

5 Typically, the high voltage applied to the support surface or spindle 6 will be approximately 20 kilovolts. Applying the high voltage to the support surface 6 and earthing the nozzle 4' acts to focus the electric field and produce less erratic spraying than would be produced

10 if the high voltage was applied to the nozzle 4' and the surface 6 was earthed. The drive motor 7 and pump 14 are then activated so as to rotate or drive the conveyor belt 6'. If required, the heater 8 may be used to generate a warm dry air flow through the chamber 2. Typically, the

15 temperature of the air within the chamber 2 will be approximately 50°C to 100°C.

The liquid pump 10 is then activated to pump liquid to the tube at a rate of between 10 and 20ml, for example about 4ml (millilitres), per hour.

20 Liquid issuing from the output nozzle 4' forms, under the influence of the applied electric field, a Taylor cone and jet which solidifies to form a fibre which is attracted to and deposits on the support surface 6 as a fibrous web or mat. The speed of movement of the

25 conveyor belt 6 is typically less than 1 metre/second (ms^{-1}) for example 0.3 ms^{-1} . The mat or web is moved away from the area of the high electric field by the conveyor

belt, is squeezed slightly against the conveyor belt 6 by the resilient lips 20 which act to compress the fibre mat or web slightly and then transferred to the further conveyor belt 6'.

5 The cutting device 11 is reciprocated towards and away from the further conveyor belt 6' by conventional reciprocating means (not shown) in synchronism with the movement of the belt so that the cutting blades 11a of the cutting device cut the compressed mat or web into 10 tablets or pills 30. The tablets or pills 30 then drop off the end of the further conveyor belt 6' and are collected in the hopper 12.

As noted above, a spraying device 13 may be provided to coat the individual tablets or pills 30 with, for 15 example, a sugar coating. The spraying device 13 may be a conventional spraying device or may be an electrohydrodynamic spraying device of the same type as the comminution arrangement 3.

Typically the gap between the outlet nozzle 4 and 20 the support surface 6 is about 10 to 20 cm.

The use of the conveyor belt arrangement enables a continuous process and also allows the highly charged fibre web or mat to be moved away from the area of the electric field leaving a more appealing lower charged 25 surface behind to facilitate the deposition of further material. In the arrangement described above, the nozzle 4' is arranged to spray horizontally onto the conveyor

belt 6 which is arranged at an angle to the horizontal. This has the advantage that any undesired large or satellite droplets issuing from the nozzle 4' will, due to the influence of gravity, fall away from both the 5 nozzle 4' and the conveyor belt 6. Where the possibility of satellite droplets is small and does not present a problem then the conveyor belt 6 may extend horizontally and the nozzle 4' may be arranged above or below the conveyor belt 6 so as to spray directly downwardly or 10 upwardly, respectively, onto the conveyor belt 6.

The liquid supplied to the tube 4 may contain a pharmacologically or biologically active ingredient such as eletriptan examples.

Experiments to determine the optimum formulation for 15 achieving a tablet which will maintain its shape but will dissolve or disintegrate readily on the tongue were carried out. These experiments were carried out using an annular nozzle which, for convenience, was arranged to spray onto a 350 mm diameter metal plate rather than 20 onto the conveyor belt 6. The nozzle 4' was separated from the plate by a distance which was varied between 60 and 200 mm and a voltage of between 25 and 30 kV was applied to the plate. Generally 30 kV was applied to the plate. The liquid to be sprayed to produce the desired 25 tablets was supplied to the nozzle 4' with a flow rate between 10 and 20 ml per hour.

The liquid to be sprayed consisted of CRODA spray

dried fish gelatin with the solvent being a water-ethanol mix. In the experiments, formulations were investigated in which 5g of the fish gelatin was dissolved in between 17 and 30 ml of the water-ethanol solvent.

5 It was found that the efficacy of the formulation was affected by the overall ratio of water to ethanol content and also by the overall viscosity of the solution. The ratio of water to ethanol was varied between 2:1 and 1:2. It was found that a higher ethanol
10 content produces a more sprayable solution but that an excess of ethanol causes the gelatin to precipitate out of solution with it being impossible to properly dissolve the 5g of gelatin in an 8 ml water : 12 ml ethanol (2:3) solvent mix. It was also found that a high proportion
15 of water provides a more stable solution that is more difficult to spray and also produces a slightly wetter product that is more likely to contain droplets in addition to the desired fibre. The best formulations were found to have a solvent consisting of 7 to 9 ml of
20 water and 10 to 11 ml of ethanol. The current preferred formulation is 8 ml of water, 10 ml of ethanol, 1 ml of peppermint flavouring (which is a mixture of water and isopropanol plus the flavouring) and 5g of the spray dried fish gelatin.

25 The less viscous solutions (that is where there was
22 to 30 ml of solvent per 5g of fish gelatin) sprayed in a more stable fashion but tended to produce droplets

and some beaded fibres. In contrast, more viscous solutions having 17 to 21 ml of the solvent produced the desired distinct fibres and resulted in tablets having only a little friability.

5 Increasing the distance between the nozzle 4' and the support surface onto which spraying was being effected increased the likelihood of fibre formation (because it allowed further time for evaporation of the solvent) and made the resultant tablet more fibrous and
10 friable. In contrast, placing the nozzle 4' very close (60 to 70 mm) to the support surface had the opposite effect with the solvent having less chance to evaporate and thus encouraging a less friable but more dense product. As a result of these experiments, it was found
15 that the optimum distance for spraying the current preferred formulation to achieve the desired low density low friability tablets was a separation of between 100 and 200 mm between the nozzle 4' and the plate with the actual distance within this range being fairly flexible.

20 The addition of sweeteners to increase the palatability of the tablet was investigated. It was found that the addition of a little (50 mg or so) of saccharine to the liquid resulted in no noticeable effect on the end tablet apart from the desired sweetness.
25 Surprisingly, however, when a similar quantity of d-sorbitol (mannitol) was added, it was found that the tablets shrank catastrophically over a day or, so

resulting in a high density rubber-like structure which would not dissolve readily in the mouth or on the tongue.

Experiments were also carried out using porcine food grade gelatin rather than fish food grade gelatin.

5 Surprisingly, the change in the type of gelatin had a significant effect on the resultant tablet and tablets produced using porcine gelatin did not achieve a low density high specific surface area structure which dissolved readily in the mouth or on the tongue.

10 Figure 3 is a view similar to Figure 2 showing a modification of the arrangement shown in Figure 2. As can be seen from Figure 3, the apparatus 1a shown in Figure 3 differs from that shown in Figures 1 and 2 in that the sprayer 13 is provided within the chamber 2 and is
15 arranged so as to direct a spray at liquid issuing from the nozzle 4a so that the fibre is coated as it is formed. Figure 3 also shows a spraying liquid reservoir 13a and pump 13b.

In the embodiments described above, the tablets or
20 pills are formed using the cutting device 11. Different forms of cutting devices may, of course, be used. For example, a pair of reciprocating knives may be provided one on either side of the conveyor belt each arranged to cut at an angle to the length of the conveyor belt so as
25 to produce lozenge shaped tablets.

In the apparatus described above, the fibres are formed using a single cylindrical liquid supply tube 4

having an annular outlet nozzle 4'. However, the apparatus may be provided with an array of such liquid supply tubes extending transversely of the direction of movement of the conveyor belt 6 or even with a matrix of 5 such liquid supply tubes. Alternatively or additionally, a slot-like nozzle may be used.

In addition, or as an alternative, a number of liquid supply tubes may be arranged along the length of the conveyor belt. Figure 4 illustrates very 10 diagrammatically a modification of the apparatus shown in Figures 1 and 2 wherein nine liquid supply tubes 4a to 4i are arranged so as to extend along the length of the conveyor belt 6. As shown in Figure 4, each liquid supply tube is connected to a respective liquid supply 15 pipe 10a to 10i to which liquid is pumped via a corresponding pump (not shown) from a corresponding reservoir (not shown). Thus, each of the liquid supply tubes 4a to 4i will be coupled via a liquid supply pipe and pump to a reservoir in the manner similar to that 20 shown in Figure 1 for the liquid supply tube 4.

The modification shown in Figure 4 has a number of advantages. In particular, it enables different liquids to be supplied via the different liquid supply tubes 4a to 4i. As one example, alternate liquid supply tubes 4a, 25 4c, 4e and 4g may supply the gelatin liquid formulation discussed above while the intervening liquid supply tubes 4b, 4d, 4f and 4h may supply a tacky ingredient such as

gum arabic or gum trathacant to facilitate adhesion of the fibres to one another and the final liquid supply tube 4i may supply a flavouring or sugar coating. Also, the use of a plurality of nozzles supplying different liquids enables, for example, active ingredients which are lypophilic as opposed to hydrophilic to be incorporated into the tablets.

To further facilitate adhesion of the fibres to one another, the nozzles of alternate liquid supply tubes may 10 be charged to opposite polarities. In addition, one or more of the liquid supply tubes 4a to 4i may be replaced by a spraying device which sprays charged dry powder of the opposite polarity to the fibres so that the dry powder is attracted to and sticks to the fibre. Such a 15 dry powder may contain an active ingredient or ingredients for the tablet and/or flavourings or colorings. One advantageous way of producing such electrically charged dry powder would be to use the triboelectric charging process. Typically, it is possible 20 to achieve charge of the order of 1 coulomb per kilogram when producing the fibres from liquid but charge of only the order of 10^{-3} coulombs per kilogram for dry powder. Thus, if the dry powder is produced to be of the opposite 25 polarity from the fibres, then the overall mat before separation into the tablets will still be charged to the polarity of the fibres but will have an overall reduced charge.

Figure 5 illustrates very diagrammatically a further modification of the apparatus described above. In this example, the conveyor belt 6 is horizontally arranged, but the further conveyor belt 6' and the cutting device 11 are omitted and a field controlling arrangement is provided so as to direct the fibres only towards certain areas of the surface 6. As shown, this is achieved by providing on the surface of the conveyor belt 6 a tray-like arrangement 16 having a regular array of tablet or pill sized and shaped recesses 16. The tray-like arrangement is designed so that the interior surface of each recess 16b is positively charged while the islands 16a between the recesses are negatively charged.

In this arrangement, the nozzle 4' is arranged to be negatively charged and the belt earthed by the high voltage source 5 so that the material issuing from the nozzle is negatively charged and thus will be attracted into the recesses 16b but repelled from the islands 16a so that a series of individual tablet sized mats or webs 20 of fibres are produced.

Figure 6 illustrates that schematically a further modification which may be made to the comminution arrangement 3. The arrangement 3a shown in Figure 6 has two reservoirs 9a and 9b containing different liquids 25 each coupled by a respective valve V1 and V3, a respective pump 10a and 10b and a further valve DV and V4 to a respective outlet nozzle 4'1 and 4'2. This

arrangement enables a first liquid to be provided within a curtain of the second liquid enabling a cord or coated fibre to be produced. It would be appreciated that Figure 6 is only very schematic. Further details of an 5 arrangement for enabling a first liquid to be supplied within a second liquid are described in WO 98/03267 (see especially Figures 11 and 14) the whole contents of which are hereby incorporated by reference.

Figures 7 to 9 are electronmicrographs showing in 10 Figures 7 and 8 the structure of a conventional freeze dried tablet and in Figure 9 the mat or web like fibre structure of a tablet produced using the apparatus shown in Figures 1 and 2 and the gelatin solution mentioned above. As can be seen, the resulting fibre consists of 15 a fine mat or web of strands or fibres which appear to be simply individual strands of rapidly dried polypeptide chains that have become entangled to form strands or fibrils. These in turn would appear to have become entangled with one another forming strings which 20 themselves become intertwined to form rope like structures which overlay one another to form a fibrous cotton wool like material. This very open fibre structure can be fully hydrolysed in the mouth with full breakdown of the secondary structure so that the fibres become 25 disentangled but will not form junctions zones which would result in gelling of the product which would be undesirable.

The active ingredient or ingredients to be supplied by consumption of a tablet or pill produced using the apparatus described above may be any agent or substance which provides a desired effect in the consumer. For 5 example, the active ingredient may be a medicament for use in the treatment by way of therapy, surgery or diagnosis or otherwise to improve quality of life of a human being or other animals. For example, the active ingredient may be nicotine, morphine, a vitamin, an 10 antiseptic, an anti-inflammatory, an antibiotic, an anti-cancer agent or other pharmaceutical product, a vaccine, a protein, or an enzyme.

The present invention also has applications outside the medical field. Thus, the apparatus described above 15 may be used to produce confectionary products which melt in the mouth. In such cases, the active ingredients may comprise at least one or more of the following: a flavouring; chocolate; a colorant; and a sweetener.

As used herein the term "biodissolvable" means 20 capable of being dissolved or disintegrated in the mouth or on the tongue of a human being or other mammal.

Other modifications will be apparent to the skilled person in the art.

CLAIMS:

1. A method of manufacturing consumable tablets, comprising:

5 supplying a liquid containing a biodissolvable carrier to an outlet;

establishing an electric field between the outlet and a support surface to cause liquid issuing from the outlet to form at least one fibre or fibrils of the 10 biodissolvable carrier which fibre or fibrils deposit(s) onto the surface to form a fibre web or mat;

separating the web or mat into a plurality of individual tablets; and

incorporating at least one active ingredient in the 15 tablets.

2. A method according to claim 1, which comprising:

separating the web or mat into a plurality of individual tablets by cutting the web or mat.

20

3. A method of manufacturing consumable tablets, comprising:

supplying a liquid containing a biodissolvable carrier to an outlet;

25 establishing an electric field between the outlet and a support surface to cause liquid issuing from the

outlet to form at least one fibre or fibrils of the biodissolvable carrier;

causing the at least one fibre or fibrils to deposit onto the surface to form a plurality of individual tablets each comprising a fibre web or mat; and

incorporating at least one active ingredient in the tablets.

4. A method according to any one of the proceeding claims, which comprises supplying as the liquid a gelatin solution.

5. A method according to any one of claims 1 to 3, which comprises supplying as the liquid a solution consisting essentially of 5 grams of fish gelatin in a solvent consisting of from 7 to 9 millilitres of water and 10 to 11 millilitres of ethanol.

6. A method according to any one of claims 1 to 3, which comprises supplying as the liquid a solution consisting essentially of 5 grams of fish gelatin in a solvent consisting of 8 millilitres of water, 10 millilitres of ethanol and 1 millilitre of peppermint flavouring.

25

7. A method according to any one of the preceding claims, which comprising providing an air flow to

encourage the deposition of the at least one fibre or fibrils on the surface.

8. A method according to any one of the preceding
5 claims, which further comprises applying heat to the region where the liquid issues from the outlet to facilitate the formation of the at least one fibre or fibrils.

10 9. A method according to any one of the preceding claims, which comprises establishing the electric field by applying a high voltage to the surface.

15 10. A method of manufacturing consumable tablets, comprising:

supplying a liquid consisting essentially of a hydrophilic solution of fish gelatin to an outlet;

20 establishing an electric field between the outlet and a support surface to cause liquid issuing from the outlet to form on the surface a web or mat consisting of at least one gelatin fibre or gelatin fibrils;

separating the web or mat into a plurality of individual tablets; and

25 incorporating at least one active ingredient and a sweetener such as saccharine into the tablets.

11. A method according to any one of the preceding claims, which comprises using as the surface a rotatable endless surface such as a belt.

5 12. A method according to any one of the preceding claims, which comprises incorporating the at least one active ingredient by spraying the active ingredient onto at least one of: the at least one fibre or fibrils; the mat or web; and the individual tablets.

10

13. A method according to any one of the preceding claims, which comprises incorporating the active ingredient into the at least one fibre or fibrils.

15 14. A method according to any one of the preceding claims, which comprises forming the at least one fibre of fibrils with a core containing an active ingredient.

20 15. A method of manufacturing a pharmaceutical product which comprises using a method in accordance with any one of the preceding claims and providing as the at least one active ingredient an ingredient which is pharmacologically or biologically active.

25 16. A method of manufacturing a confectionary product which comprises using a method in accordance with any one of claims 1 to 14 to form a plurality of individual

tablets or sweets and incorporating as the at least one active ingredient at least one of the following: sugar; chocolate; a flavouring; and a colorant.

5 17. Apparatus for manufacturing consumable tablets, comprising:

means for supplying a liquid containing a biodissolvable carrier to an outlet;

10 means for establishing an electric field between the outlet and a support to cause liquid issuing from the outlet to form at least one fibre or fibrils of the biodissolvable carrier which deposit(s) onto the support to form a fibre web or mat;

15 means for separating the web or mat into a plurality of individual tablets; and

means for incorporating at least one active ingredient in the tablet.

18. Apparatus according to claim 15, wherein the
20 separating means comprises at least one cutter.

19. Apparatus for manufacturing consumable tablets, comprising:

25 means for supplying a liquid containing a biodissolvable carrier to an outlet;

means for establishing an electric field between the outlet and a support to cause liquid issuing from the

outlet to form at least one fibre or fibrils of the biodissolvable carrier;

means for causing the fibre or fibrils to deposit onto the support to form a plurality of individual 5 tablets each comprising a fibre web or mat; and

means for incorporating at least one active ingredient into the web or mat.

20. Apparatus according to claim 17, 18 or 19, further 10 comprising a supply of gelatin solution to form the liquid.

21. Apparatus according to any one of claims 17 to 19, further comprising, as the liquid, a supply of a solution 15 consisting essentially of 5 grams of gelatin in 7 to 9 millilitres of water and 10 to 11 millilitres of ethanol.

22. Apparatus according to any one of claims 17 to 19, further comprising, as the liquid, a supply of a solution 20 consisting essentially of 5 grams of gelatin in 8 millilitres of water, 10 millilitres of ethanol and 1 millilitre of peppermint flavouring.

23. Apparatus according to any one of claims 17 to 22, 25 further comprising air flow causing means for facilitating the deposition of the at least one fibre or fibrils onto the support.

24. Apparatus according to any one of claims 17 to 23, wherein the electric field establishing means comprises means for applying a positive potential to the support.

5 25. Apparatus according to any one of claims 17 to 24, further comprising a rotatable endless surface as the support.

10 26. Apparatus according to any one of claims 17 to 25, further comprising means for applying heat to the region where liquid issues from the outlet.

15 27. Apparatus according to any one of claims 17 to 26, further comprising spraying means for spraying the at least one active ingredient onto at least one of: the fibre or fibrils; the mat or web; and individual tablets.

20 28. Apparatus according to any one of claims 17 to 27, further comprising means for supplying the active ingredient so that the at least one fibre or fibrils have a core containing the active ingredient.

25 29. A consumable tablet manufactured using a method in accordance with any one of claims 1 to 16 or apparatus in accordance with any one of claims 17 to 28.

30. A consumable tablet comprising a web of fibres of a biodissolvable carrier material carrying at least one active ingredient, the carrier material being arranged to dissolve or disintegrate on the tongue or in the mouth
5 of the consumer such as a human being or other mammal.

31. A consumable tablet comprising a web of fibres or fibrils of fish gelatin carrying at least one active ingredient, the tablet being arranged to dissolve or
10 disintegrate on the tongue or in the mouth of the consumer such as a human being or other mammal.

32. A tablet according to claim 30 or 31, wherein the active ingredient comprises a pharmacologically or
15 biologically active ingredient.

33. A tablet according to any one of claims 31 to 32, wherein the web of fibres is formed using electrohydrodynamic comminution.

20

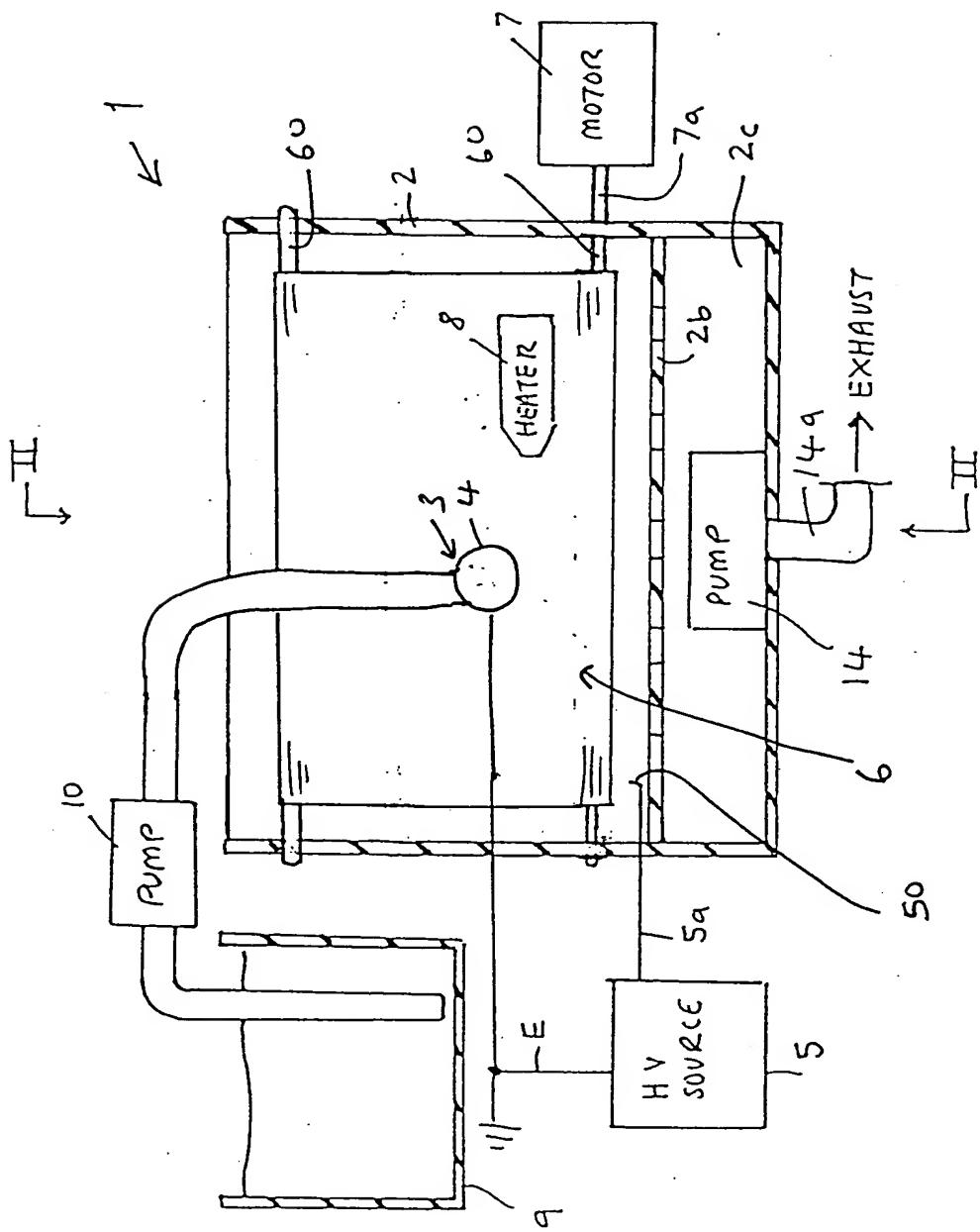
34. A method of manufacturing consumable tablets substantially as hereinbefore described with reference to the accompanying drawings.

25 35. Apparatus for manufacturing consumable tablets substantially as hereinbefore described with reference to the accompanying drawings.

36. A consumable tablet substantially as hereinbefore described with reference to the accompanying drawings.

37. Use of electrohydrodynamic comminution to produce
5 a consumable tablet.

FIG 1



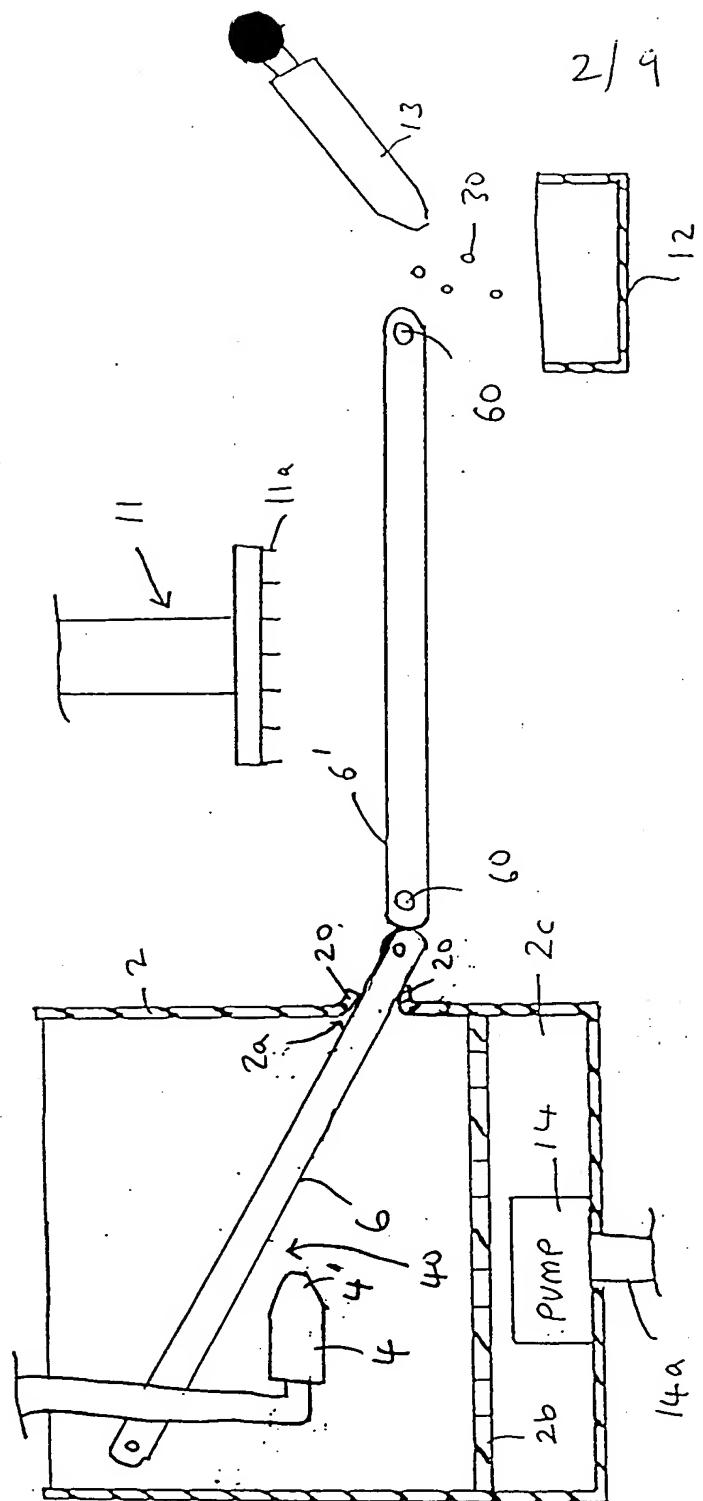


Fig. 2

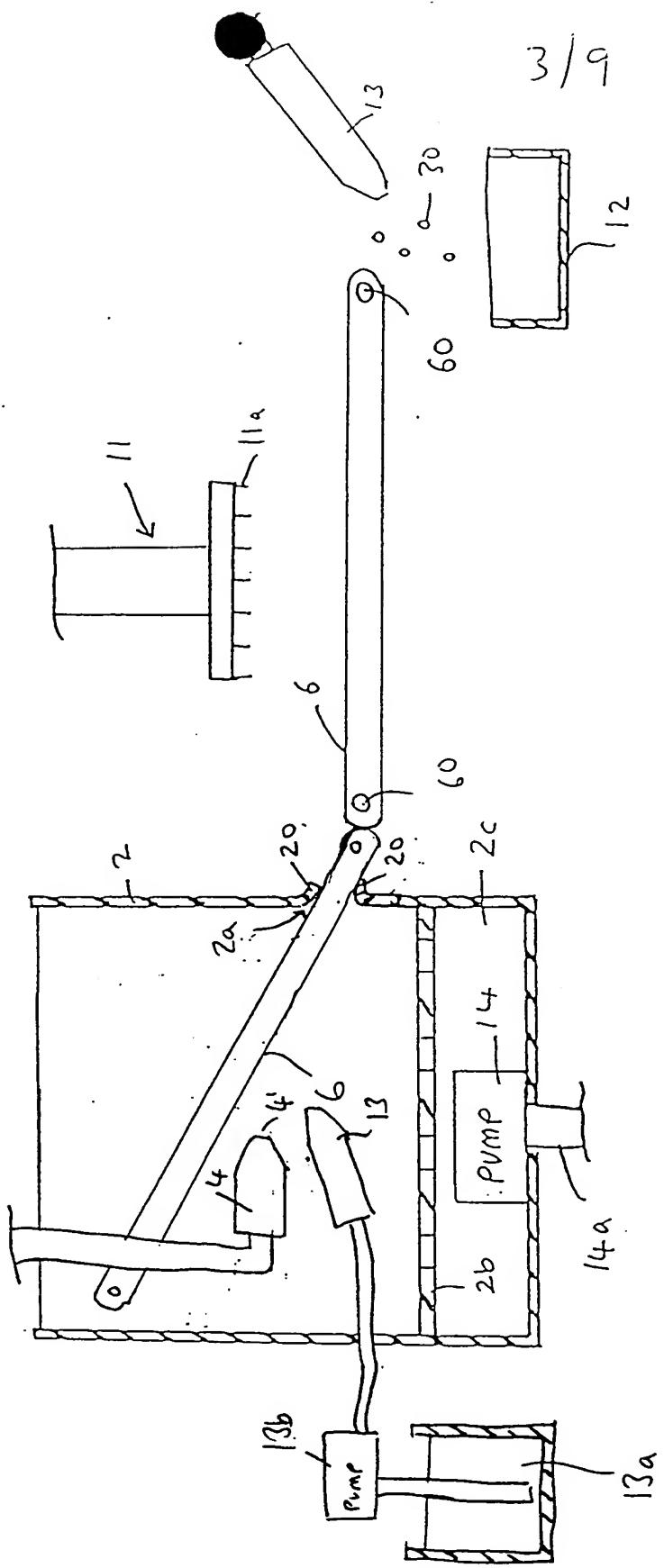


Fig. 3

4/9

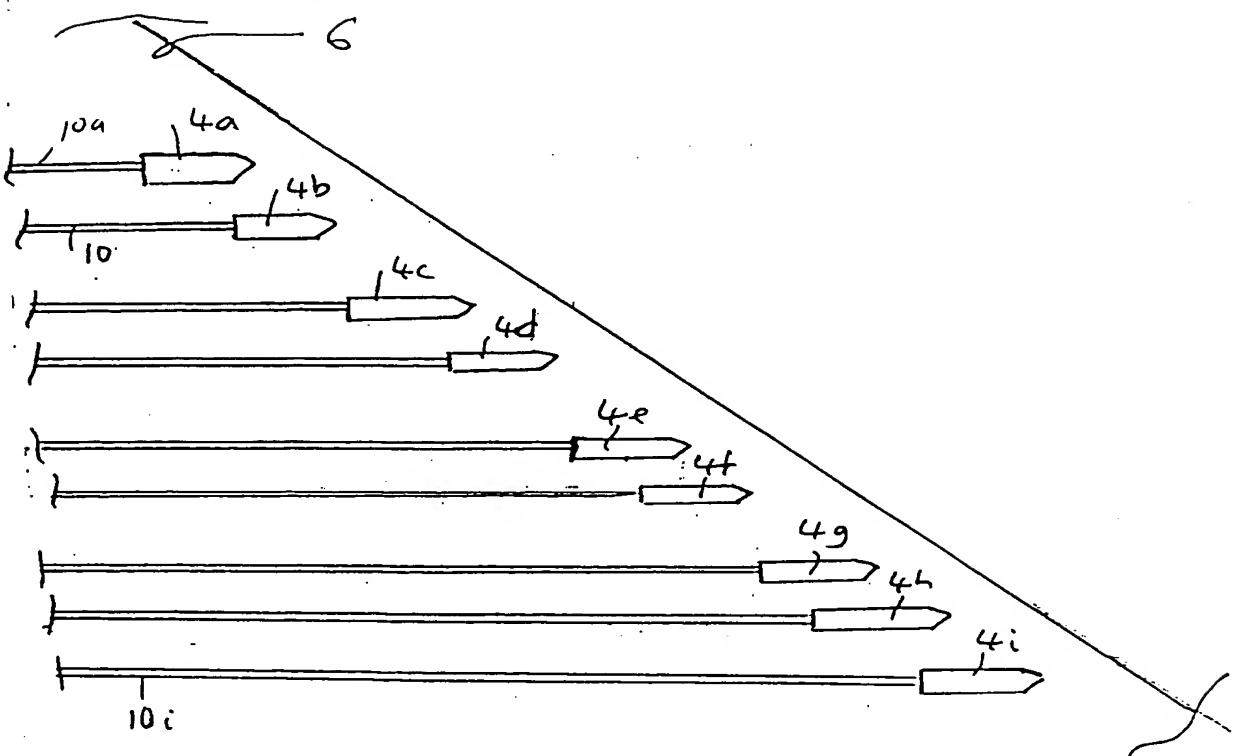
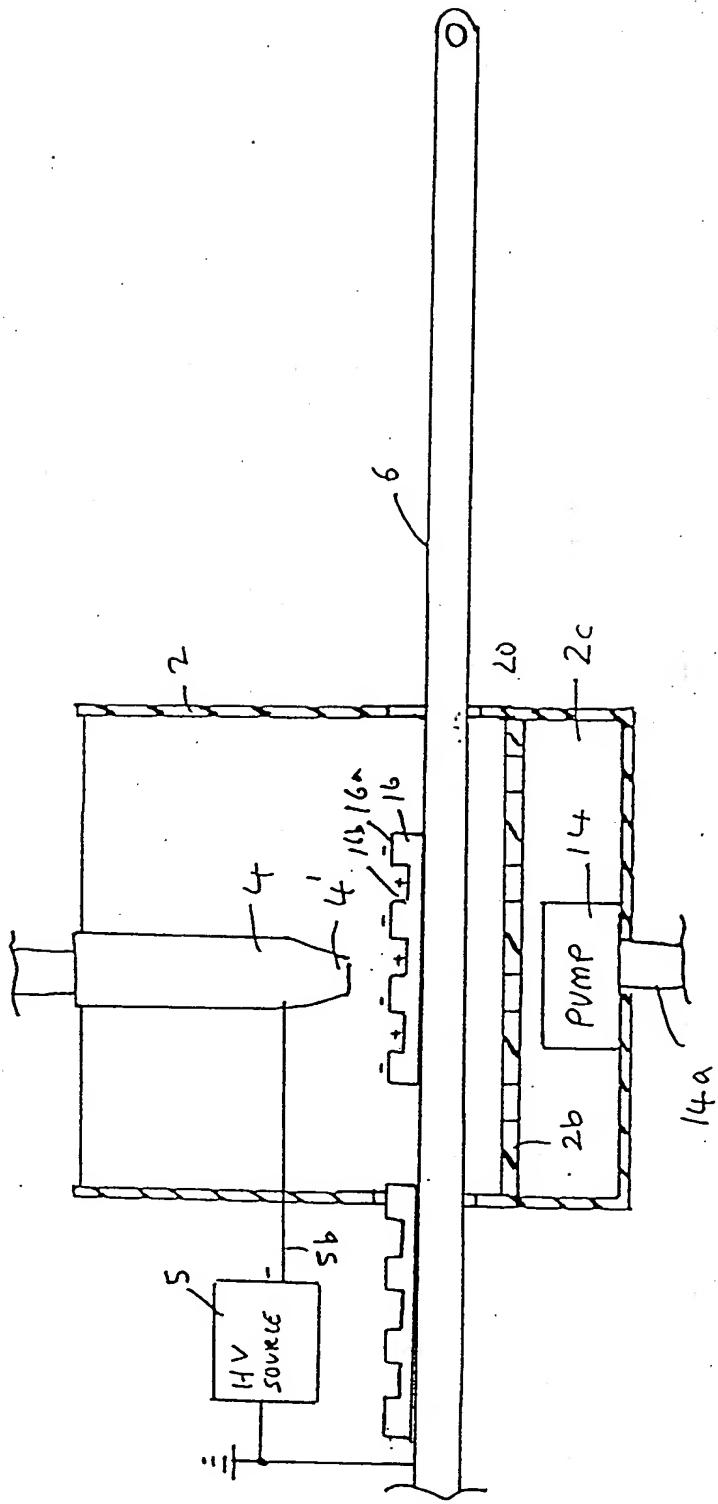


FIG 4



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FIG. 5



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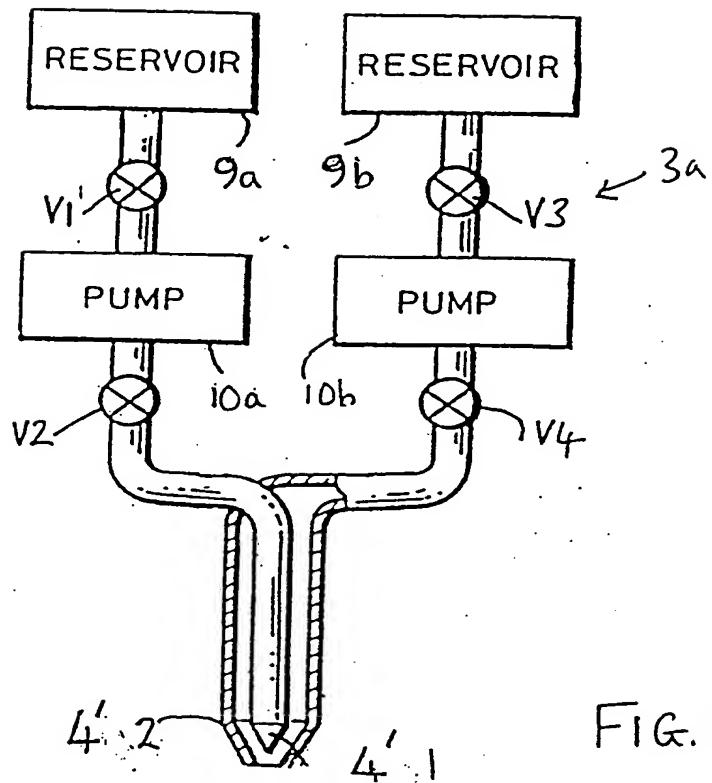


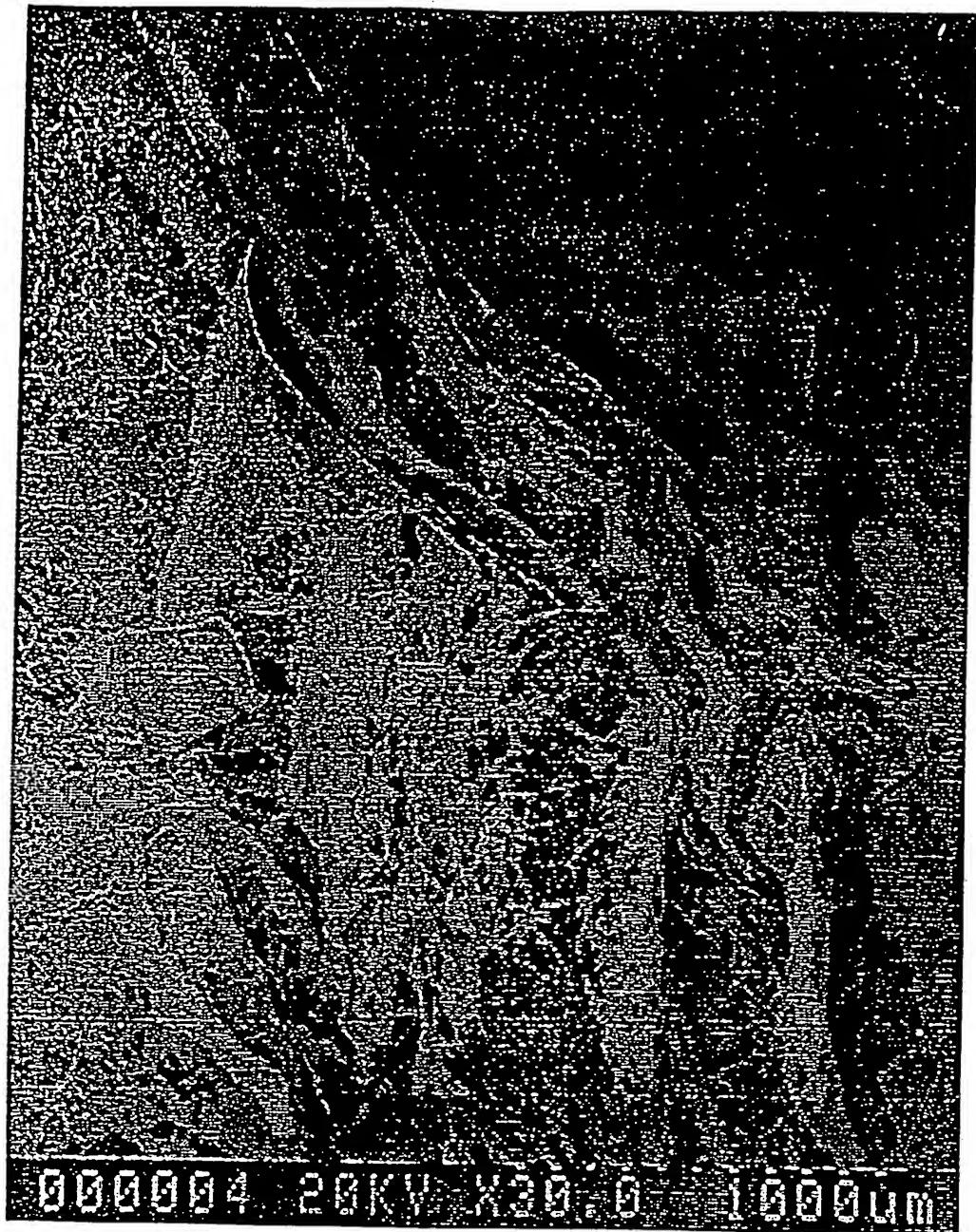
FIG. 5

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FIG. 7

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000004 28KV X20.0 - 1000nm

FIG.-8



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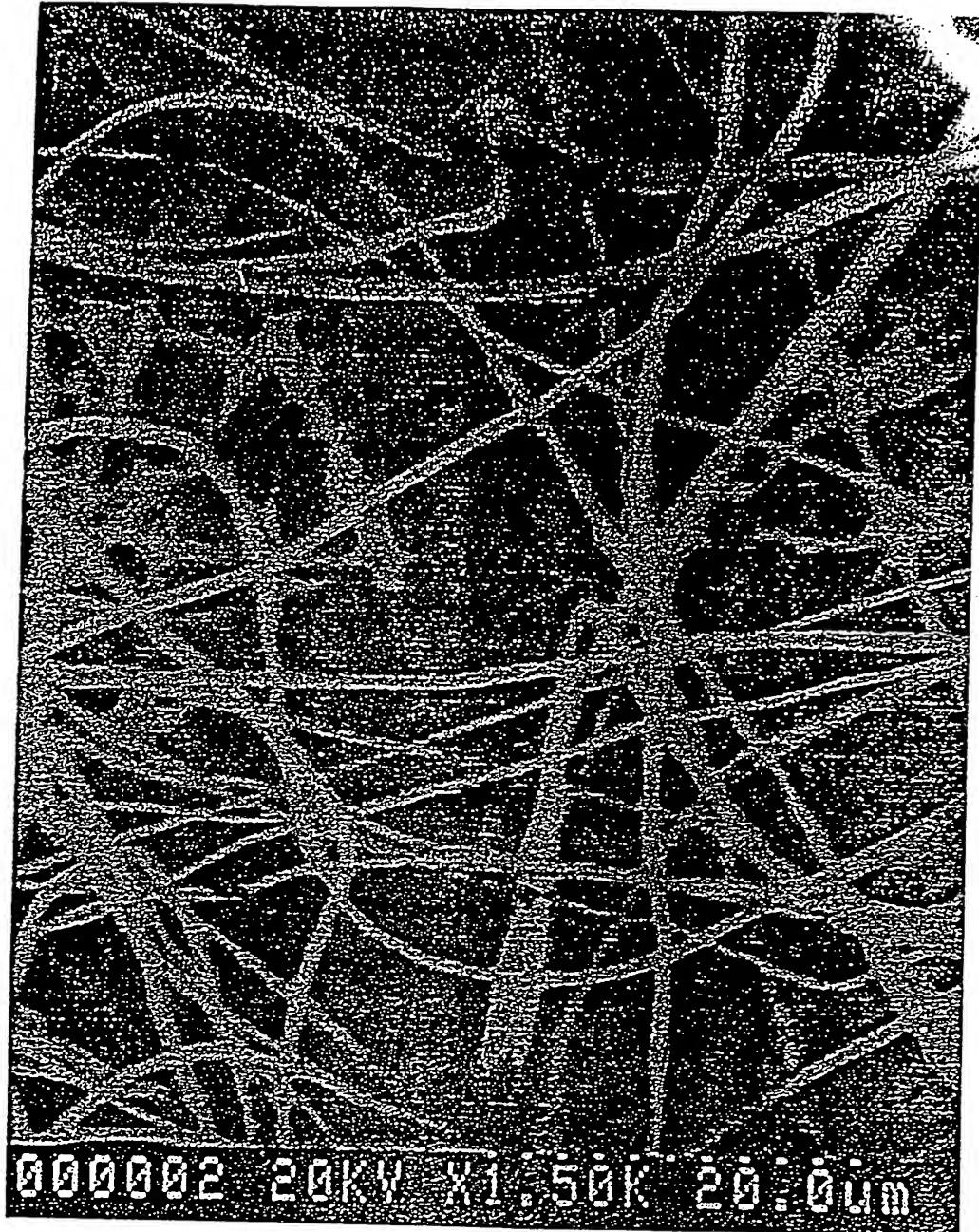


FIG. 9

PCT NO : GB00 / 01728

Form 23/77 : 23/5/00

Agent : Beresford & Co